SECTION 2
ISSUES CONCERNING ESTABLISHMENT OF A TRENDS NETWORK

Current EPA GPRA commitments specify a goal of reducing air toxics emissions by 75% from 1993 levels in order to significantly reduce the risk to Americans of cancer and other serious adverse health effects caused by airborne air toxics. To assess progress toward that goal, EPA has initiated numerous activities aimed at providing the best technical information regarding air toxics emissions, ambient concentrations, and health impacts. One key element of the full air toxics assessment process is the long-term monitoring of ambient concentrations of air toxics compounds at sites throughout the nation using consistent techniques to allow analysis of patterns and trends in ambient air toxics measurements.

2.0 CONSISTENCY OF DATA

The ability to detect and assess trends on a nationwide basis relies upon standardized operation of the NATTS Program based upon two key components:

- Strict and specific DQOs for the program; and
- Stability of a monitoring site including its location, measurement techniques, and its operations over the specified period of time to allow evaluation of trends.

Standardization of operations against a specific set of MQOs will yield consistency of data among the sites included in a monitoring network to allow evaluation of trends nationwide. To provide data usable for establishing trends at a given area, a monitoring site must be operating in the same location for an extended period of time (i.e., years). To know within the specified limits of error whether the concentrations of air toxics compounds have decreased by 75% in a given urban area since 1993, the same site must be performing the same measurements at the same frequency from 1993 (the baseline year) until the present. To perform a nationwide evaluation of trends, consistency of data among all of the sites in the monitoring network is essential: monitoring sites must be performing the same measurements using identical sampling

and analytical methods in the same way over the specified long-term period, meeting the same quality specifications and reporting data in the same way. This consistency will be achieved by performing the same measurements in the same way and meeting the same quality specifications at every site. Even if the same siting criteria, measurement procedures, and analytical procedures are used, variability will still be introduced into the data set because there are different laboratories analyzing the samples using the same methods. Preliminary pilot study data will assess the relative proportions of the variability introduced by different collection equipment and analysis at different laboratories. The impact on overall data consistency of different collection equipment, laboratories, and reporting practices must be established and this impact minimized. The function of this guidance document is to provide guidelines for standardization of the sampling, analytical, quality assurance, and reporting methodology.

2.1 ESTABLISHING MONITORING OBJECTIVES: THE ROLE OF DATA QUALITY OBJECTIVES AND THE QUALITY ASSURANCE PROJECT PLAN

The components essential to the systematic planning process that will result in monitoring data of the quality and quantity required to achieve program goals are DQOs, MQOs and a QAPP. The project DQOs provide the answer to the critical question of how good the data must be in order to achieve Program goals. DQOs are used to develop the criteria that a data collection design should satisfy, including when to collect samples, where to collect the samples, the tolerable level of decision errors for the study, and how many samples to collect. Using the DQO process assures that the type, quantity, and quality of environmental data used in decision making will be appropriate for the evaluation of national trends in ambient air toxics measurements. DQOs for the overall trends monitoring network have been determined by EPA (see Section 3 of this document). Individual monitoring sites may have additional DQOs as dictated by local priorities, but local DQOs cannot be less stringent than the EPA DQOs. MQOs for the six NATTS compounds (benzene, 1,3-butadiene, formaldehyde, acrolein, arsenic compounds, and hexavalent chromium) are also found in Section 3.

EPA policy requires that all projects involving the generation, acquisition, and use of environmental data be planned and documented and have an Agency-approved QAPP prior to the start of data collection. The primary purpose of the QAPP is to provide an overview of the project, describe the need for the measurements, and define QA/QC activities to be applied to the project, all within a single document. The QAPP should be sufficiently detailed to provide a clear description of every aspect of the project and include information for every member of the project staff, including site operators, laboratory staff, and data reviewers. The QAPP facilitates communication among clients, data users, project staff, management, and external reviewers. Effective implementation of the QAPP assists project managers in keeping projects on schedule and within the resources budgeted. State and local organizations must develop their own QAPPs that meet their specific needs.

2.2 ACHIEVING MONITORING OBJECTIVES

The monitoring network must be designed to address all the needs of the NATTS Program and to satisfy the following objectives:

- Measure the pollutants of concern to the NATTS Program. As shown in Table 1.1-1, monitoring approaches for the pollutants of concern to the NATTS Program exist and are regularly being applied through the UATMP, with the exception of acrolein.

- Ensure nationally consistent data of high quality. To ensure nationally consistent data of high quality, the correct execution of specific sampling and analytical methodology is required. The methods selected must consider the threshold concentrations at which adverse health effects have been documented and provide sufficient sensitivity to provide an adequate limit of detection. The field and laboratory monitoring protocols must provide for adequate QA and data management, including reporting practices.

- Collect a sufficient amount of data to estimate annual average concentrations at each monitoring site. A general guideline to estimate annual average concentrations at each monitoring site is to collect a minimum of one 24-hour sample every six days, a regime that will result in at least 61 samples per year, together with the requisite number of duplicates, replicates, etc. For a particular pollutant, however, the amount of data that is sufficient will depend on the

estimated precision and accuracy of the monitoring method. Guidance on the method precision and accuracy that will be required will follow from the DQOs established by EPA.

- Complement existing programs. The NATTS Program network will be integrated with existing programs to achieve efficiencies of scale to the extent that methodologies are compatible. The NATTS Program will maximize the use of existing platforms and take advantage of mobile monitoring and saturation monitoring resources, where appropriate.

- Reflect community-oriented population exposure. Stationary monitors should be sited to be representative of average concentrations within a 0.5- to 4-kilometer (km) area (i.e., neighborhood scale). These neighborhood-scale measurements are more reflective of typical population exposure, can be used to estimate long-term population risk, and should be the primary component of the NATTS Program. Whatever the scale of measurement, the monitors should represent typical population exposure as well as exposure in communities near air toxics emission sources that may be impacted disproportionately.

- Represent geographic variability. A truly national network must represent a variety of conditions and environments that will allow characterization of different emissions sources and meteorological conditions. This NATTS Program would support population risk characterization, understanding of the relationships between emissions and air quality under different circumstances, and allow for tracking of changes in emissions. National assessments should reflect the differences among cities and between urban and rural areas for selected HAPs, so the network should:

  - Include cities with high population risk (both major metropolitan areas and other cities with potentially high anticipated air toxics concentrations);

  - Distinguish differences within and between geographic regions (to describe characteristics of areas affected by high concentrations vs. low concentrations);

  - Reflect the variability among pollutant patterns across communities; and

  - Include background monitoring.

The initial focus of the NATTS Program on community-oriented locations will provide a population-oriented approach analogous to the core network for particulate matter with an

aerodynamic diameter of ≤ 2.5 micrometers (μm) particulate matter with an aerodynamic diameter ≤2.5 μm ($PM_{2.5}$) and the basis for the National Air Monitoring Station (NAMS) trend network for the criteria pollutants. The NATTS Program will emphasize fixed station, long-term monitoring to allow the assessment of trends.